

Final Report

NAG5-10588 "Brown Dwarfs: Discovery and Detailed Studies"

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The grant supported my research and that of my student (Ben Lane) and post-doctoral fellow (Zapatero Osorio). We were productive as can be seen from the list of publications below. In particular, we note three firsts. Using the exquisite angular resolution provided by the AO system at Keck we were able to directly determine the masses of two objects and show that one was a brown dwarf -- the first direct determination of the mass of a brown dwarf. Next, Mr. Lane reported the first direct demonstration of pulsations of a Cepheid star (this report received attention in the popular press). Finally, Dr. Zapatero Osorio continued her work on the search for young brown dwarfs and planets in young clusters with considerable success -- namely the detection of objects with mass below $10 M_J$ (these can be plausibly argued to be freely floating planets).

Mr. Lane graduated and is now a Pappalardo Fellow at MIT and Dr. Zapatero Osorio obtained a position back in her home country.

Publications:

- [1] "The Orbit of the Brown Dwarf Binary Gliese 569B",
Lane, B. F., Zapatero Osorio, M. R., Britton, M. C.,
Martin, E. L. & Kulkarni, S. R., 2001, ApJ 560, 390L.
- [2] "Interferometric Measurement of the Angular Sizes of Dwarf
Stars in the Spectral Range K3-M4",
Lane, B. F., Boden, A. F. & Kulkarni, S. R. 2001,
ApJ 555, 81L.
- [3] "Direct detection of pulsations of the Cepheid star zeta Gem and
an independent calibration of the period-luminosity relation",
Lane, B. F., Kuchner, M. J., Boden, A. F., Creech-Eakman, M.
& Kulkarni, S. R. 2000, Nature, 407, 485
- [4] "Lithium and H α in stars and brown dwarfs of sigma Orionis",
Zapatero Osorio, M. R., Bejar, V. J. S., Pavlenko, Ya.,
Rebolo, R., Allende Prieto, C., Martin, E. L.
& Garcia Lopez, R. J. 2002, A&A 384, 937